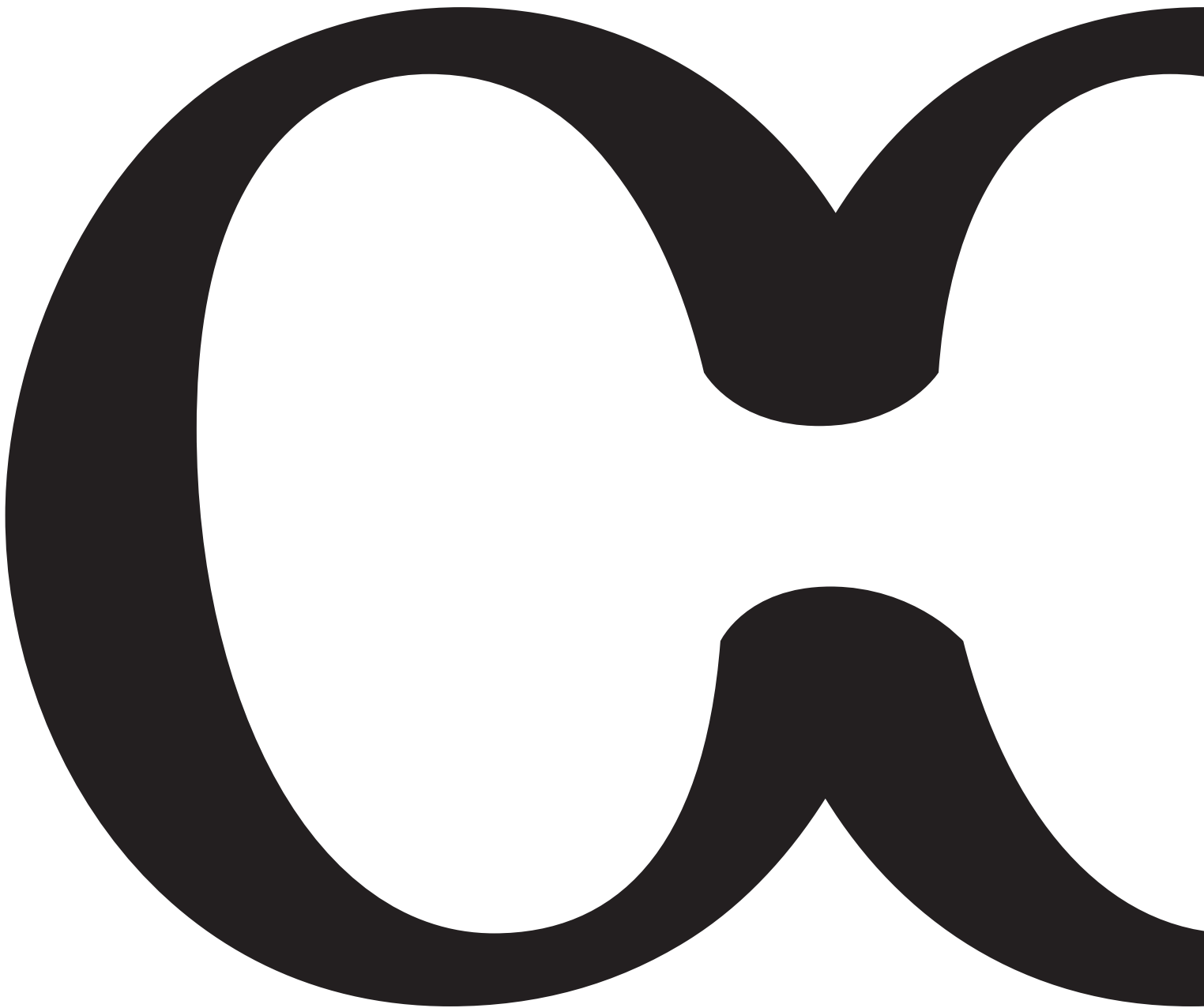


# pho·no·type

THE VISUAL IDENTITY OF A LANGUAGE ACCORDING TO ITS PHONOLOGY



WALDA VERBAENEN

# PHONOTYPE

THE VISUAL IDENTITY OF A LANGUAGE ACCORDING TO ITS PHONOLOGY

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Graphic Design  
MA Reading Type and Typography



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‘THERE ARE NO PEOPLE WITHOUT LANGUAGE’  
‘THERE IS NO LANGUAGE WITHOUT CULTURE’  
Ben (Vautier)



Image 1: Er is geen volk zonder taal. Er is geen taal zonder kultuur.  
Acrylic on canvas. Ben. (collection M HKA, 1987)

### ABSTRACT

Different languages have different pronunciations and thus different identities.

One out of ten adults in Belgium has difficulties with reading or writing. Almost 20% of the refugees currently arriving in Belgium are illiterate. Our Western culture will develop more and more into a cultural mix. Our Dutch/Flemish language is characterised by different dual sounds, mainly in the vowels. This causes complex problems when trying to master the language. This research tries to offer a solution through Typedesign to overcome this problem. By making adjustments and additions within the visual structure of a font, language can develop a proper visual identity. This research tries to show a visual identity for the Dutch language according to its phonology, that is both functionally and aesthetically new. In addition to the role typography can have to visualize the identity of our Dutch language, this project also wants to identify the supporting function that typography can offer, experimentally and functionally.

1. [https://www.belgium.be/nl/Leren/permanente\\_vorming/alfabetisering](https://www.belgium.be/nl/Leren/permanente_vorming/alfabetisering)  
2. [https://www.vrt.be/vrtnws/nl/2016/02/01/\\_17\\_procent\\_van\\_inburgeraarsisanalfabeet-1-2561677/](https://www.vrt.be/vrtnws/nl/2016/02/01/_17_procent_van_inburgeraarsisanalfabeet-1-2561677/)

### 1. TRANSLATION OF THE DUTCH LANGUAGE INTO TYPOGRAPHY

There are thirty human rights. Education is one of them. And here literacy plays an important role and this is intrinsically connected to type. Literacy gives people the opportunity to acquire knowledge, and a way to develop themselves. Being literate means that you are able to read and write. Unfortunately, in Belgium one out of 10 adults experience difficulties with reading and/or writing<sup>1</sup>. A key to success when reading (and thus writing) is phonological awareness (Rayner & Pollatsek 1989): linking sounds to letters. A good reader has much better future prospects than a poor one (Unger 2007, Bessemans 2012). Mastering a language by being able to read, speak and write — visualized by the alphabet —, enables people to communicate with each other, exchange ideas and opinions, educate themselves, and helps to build a social network and relations. (Unger 2007)

A language, such as Dutch, is in continuous development. Its spelling is updated every five years and yearly new words are added to the dictionary. We are always in a process of learning and thus education. As cultures enrich as a consequence of immigration, the education of languages needs to develop as people approach the language of the host country with different backgrounds (e.g. age, language background, illiteracy...). Almost 20% of the refugees currently arriving in Belgium are illiterate<sup>2</sup>.

Some languages are easier to learn than other languages. Even though the Dutch language is considered a transparent language, the language does not always seem to be logically structured.

The Dutch alphabet is made up of 26 letters, but there are more than 40 phonemes. The fact that we have more sounds than letters, makes it difficult to learn the Dutch language, especially for people who immigrate to Belgium or the Netherlands and need to master another language than their mother tongue.

When the pronunciations can be translated and visualized into type, type can become functional in learning a new language. In the past, type design has proven to be a useful tool when it comes to master a new language. Some well-known experiments are the Pitman's Initial Teaching Alphabet for the English language or the experiments of Pierre Di Sciullo for the French language (see chapter 2.2.1). Other experiments on this theme are perhaps less known, but are therefore no less interesting. Every experiment had its benefits and failures. In this project I would like to use type as a facilitating process of the learning of the Dutch language, and thus offering a supporting function to improve reading. Type holds the promise to be a powerful tool for visualizing the bottlenecks of a language. On top, type can possibly represent the visual identity of a language by means of specific letters for typical pronunciations. Different tongue traps give a cultural specificity to language. Every language has its own identity, based on the corresponding alphabet and its phonology. An identity of a language might be able to visualize its culture and enrich the graphic language by a more pronounced expression in used typography.

Typography has evolved enormously since digital evolution. Many typographers work experimentally, and use typography as a visual element within graphic design. Prof. Dr. Ann Bessemans described already the importance of visual typography and unconventional typefaces in her lecture 'Typography speaks. The vocabulary for improving printed matter' in 2017 in Warsaw and in 2018 at PXL Hasselt. Typefaces can be seen as visual identities. Conventional letterforms allow us to read without seeing. Convention is a common basic form/



Image 2: Conventional letterforms  
by Adrian Frutiger (Frutiger, 1981)

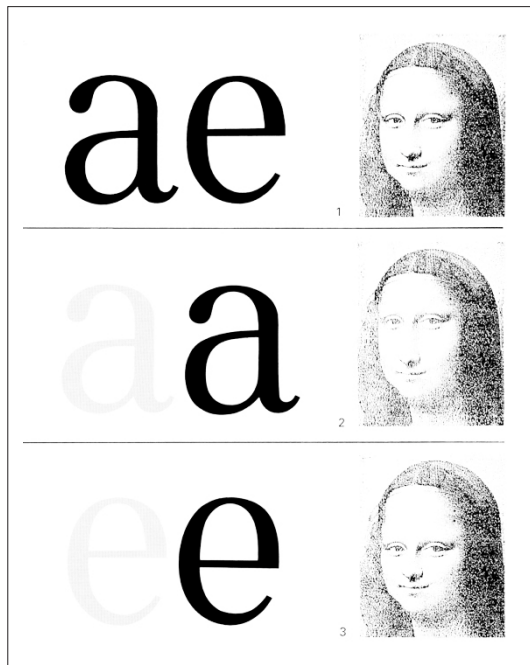


Image 3: Conventional proportions  
by Adrian Frutiger (Ahrens, 2008)

shape that can be found across different typefaces. If we want to use type as a visual element, it's also important to have a look at the convention by making it more distinguishing in its form. Adrian Frutiger described this very well with his conventional letterforms (image 2).

Frutiger has illustrated the conventional proportions by changing the proportions in the face of the Mona Lisa. It's a search for a basis structure or convention. But it is also a search for another visual identity.

When the letter shape removes itself from the convention it can become more visual (image 3).

When we have a look at experimental Type design in history, the borders of conventions and legibility have often been tested. Designers have tried to create fonts that are easier to read. Conventional letter shapes were replaced by newly designed lettershapes, to support the phonetical individuality within the alphabet.

Experimental and unconventional fonts explore the boundaries of legibility, and are therefore balancing between noticeability and recognizability.

Typographical experiments for improving reading have been done during the twentieth century. Some experiments are playing only with the letterforms itself, but some of them have another underlying aspect, they describe visually the phonological pronunciation. Attempting to change the basic shapes of the letters or to replace them with entirely new shapes is a very interesting approach, but has not always turned out to be successful.

This is where my research question arises.

Is it possible to develop a typeface for learning Dutch that is both functional and recognizable? Can typical Dutch features in language be visually translated in type and therefore be functional by supporting the learning process of reading aloud and serve as an identity of the language as well?

The aim of this research is to develop a typeface within which the Dutch phonetic differences are visually presented. The learning of a language can be improved in a more easy and well-founded manner, with a focus on its pronunciation.

1 Grapheme: A letter character or letter combination which expresses a difference in sound.  
2 Phoneme: A speech sound.  
3 Long and short pronunciations can be related normally to open and closed vowels, for example ga, sta (open), gat, bad (closed). But 'baden' and 'gaten' can not fit in this closed vowels, and will be pronounced long.

## 2. CONTEXT

‘TO READ IS TO LIGHT A FIRE,  
EVERY SYLLABLE THAT IS SPELLED OUT IS A SPARK’  
(Victor Hugo)

### 2.1 LEARNING A LANGUAGE

When you learn your native language as a child, sounds become evident while you grow up with it. We learn to speak before we learn to read and write. We are picking up sounds and conversations through family and people surrounding us. As a child we already use grammar without realizing how our language works. The language that we will master afterwards through education (reading and writing) becomes an addition to the spoken language.

Language is part of a biological heritage. Talking is a natural activity, such as eating, walking, sleeping. Unconsciously, a child learns to speak its native language by means of the sounds of the spoken language that surrounds him/her. We learn to speak before we learn to read and write. In contrast to talking, there is nothing natural about reading and writing. The latter two are techniques that must be learned (Moonen 2012). The sounds that we speak need to be transmitted into signs: letters. This is where difficulties may arise.

#### 2.1.1 The complexity of the Dutch language due to its phonology

If there were be one letter for each sound, we would be never get confused about how to write a pronounced word, or how to pronounce a word that you read. (Nienke van Atteveldt, 2002). It would mean that a language is 100% transparent. Dutch is a more transparent language than English, but the lack of transparent features in the visual language of any language complicates the task of mastering a certain language (Hengeveld and Leufkens). Moonen (2012) states that, phonological consciousness is all about sounds, not about letter groups or letter names. When graphemes<sup>1</sup> are not pronounced consistently, and therefore receive other phonemes<sup>2</sup>, learning a language becomes more difficult. Dutch phonemes are not easy to understand at all as there is not a clear logic: The alphabet has 26 characters and the Dutch language between 40 and 48 phonemes. Which means different combinations of the 26 letters from the alphabet must be used to construct these phonemes. Underneath, insight will be given in non-transparent Dutch features.

To begin with, Dutch vowels such as a, e, u, o can be — within the same visualization — pronounced in two ways, namely a short or long pronunciation<sup>3</sup>. There are open and closed vowels, like the a in ‘ga’ (open, long pronunciation) or in ‘kat’ (closed, short pronunciation). But the Dutch language has also open and closed ‘sounds’. For example the vowel a in ‘bad’ has a short pronunciation, while the vowel a in ‘baden’ has a long pronunciation. The letter e can even be pronounced in three different ways, such as in the word ‘hemelbed’. Secondly, Dutch has typical letter combinations that represent the same phoneme as another letter, for example ch and g, which both are pronounced as ‘g’, like in ‘echt’ and ‘geld’ or x and ks like in ‘ex’ or ‘fiks’. Also, Dutch has letters that can express itself in two different phonemes, like c in

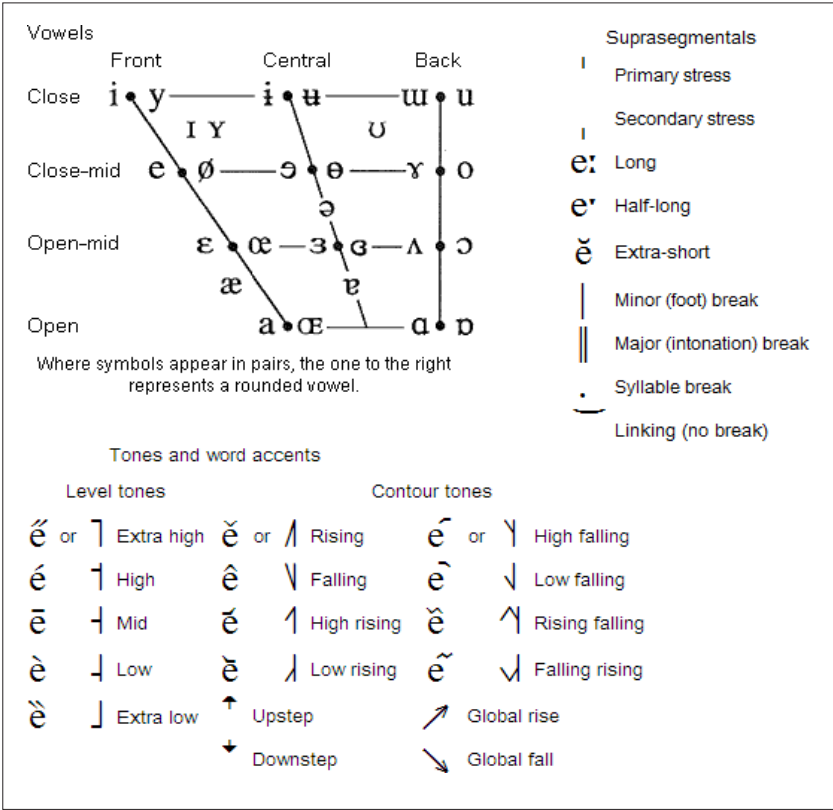


Image 4: Image IPA system (internationalphoneticalphabet.org, 2019)

4 <http://www.internationalphoneticalphabet.org>  
5 Information of:  
integratie-inburgering.be  
onderwijs.vlaanderen.be/onthaalonderwijs-voor-anderstalige-nieuwkomers  
Open school Antwerp, interview and visit lesson.

‘circus’ where the first c is pronounced as ‘s’ and the second c is pronounced as ‘k’ or the letter d can be pronounced as well as ‘d’ or ‘t’, as in the word ‘bed’, which therefore has the same pronunciation as the word ‘bet’.

2.1.2 International Phonetic Alphabet (IPA)

To teach the phonetics of languages, a set of symbols was developed in 1896. The last update was in 2005. It consists of 107 letters, 52 diacritics, and four prosodic marks.<sup>4</sup>

The IPA (The international Phonetic Alphabet) system, also called ‘the phonetic script’, visualizes how language should be spoken using phonetic symbols. The IPA system is based on a system that visualizes where the sounds are formed in the mouth. Front, rear, with open or closed mouth. Therefore, the IPA offers good readers the opportunity to understand and learn all language pronunciations. It is a thorough balanced system for those who wish to refine their knowledge of other languages.

You could ask yourself why you should look for a new visual way to display the phonology of language and make it clearer if the IPA can be used. Well, the IPA seems to have some pitfalls. First, it is very difficult to get used to the symbols if you are illiterate, speaking with a strong dialect (Bormans 2014) or being a struggling reader. Secondly, for a beginning reader it might even complicate the task of learning to read (aloud) more as you need to learn two codes — alphabet and IPA — simultaneously and make visual links between them. Thirdly, it is a code language in addition to learning a language, not into the language itself.

Finally, visualizing the phonetics of the Dutch language within the alphabet itself — the letter image — seems to have an added value other than IPA. It has never been designed for the Dutch language and therefore it can be an innovative approach in learning to read a language in a time efficient way.

2.1.3 Dutch pronunciation for foreign-speaking new citizens

The target audience of this project will be the foreign-speaking newcomers (refugees and their children, adopted children and other foreign-language newcomers) who will start to learn the Dutch language. The foreign-speaking newcomers need a tool to support their arrival in Belgium to help them learn the inconsistent pronunciation of the Dutch language easily.

Depending on age and literacy, different levels of language learning are used in Belgium for the foreign-speaking newcomers.

The primary and secondary schools offer special education to teach newcomers to the Dutch language and to integrate them into education and society.

Just like other children, they must comply with compulsory education and have the right to enroll in a school.

There’s a different approach in education depending on the age<sup>5</sup>:

a. Primary education

This education in in primary schools consists of 1 or 2 reception years (with possibly a follow-up year). The organizing school has great autonomy in how to organize this. For example, they can put the children in an existing class, or create a separate class for the newcomers. The children have not reached the age of 12.

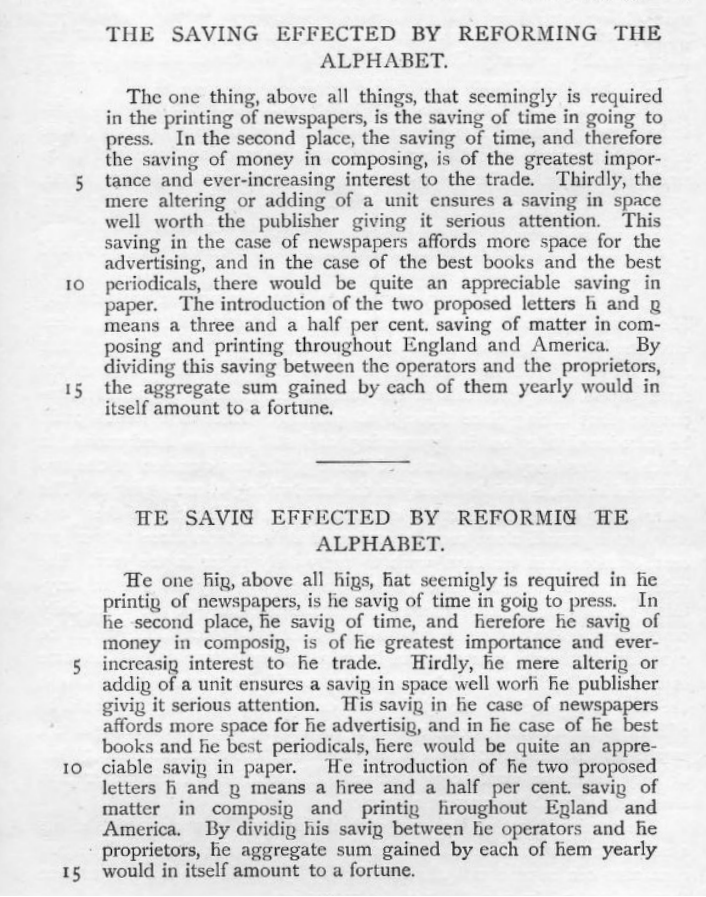


b. Secondary education  
Students have at least the age of 12 years and are under 18 (on 31<sup>st</sup> of December of the school year).  
Foreign-language pupils receive 1 year of Dutch language lessons in reception education in secondary education. Then they receive guidance in further education.

c. Adult education  
18 years or older  
On the basis of an intake interview and a test, adult speakers of other languages are referred to the most suitable offer of Dutch as a second language (NT2) in one of the centers offering NT2 courses. This can be a standard Dutch course or a series of academic or professional Dutch lessons. Other methods are used to teach our language to these foreign speakers. In the first place they will work on ‘technical’ reading. ‘Reading comprehension’ appears to be a difficult factor to learn in a short time. Integration will also be an important issue, next to learning the language.

The implementation of this project into the reading learning system for foreign speaking new citizens could be a tool to offer a basis for the understanding but also the pronunciation of the Dutch language.

Image 5. The saving effect by reforming the alphabet. Digraphs th en ng by Legros and Grant, 1916 (Legros and Grant, 1916)



## 2.2 EXPERIMENTATION IN TYPE

When letter shapes deviate from their conventional forms, they are described as more experimental (Unger, 2006). In this situation, experimentation would mean, in my eyes, that letters grow as greater and stronger visual images. As pure convention is lacking in these type designs, they want to make statements that question the convention. These statements can serve different purposes that clearly link with my topic, namely for identities or for an improving reading.  
Experimentation within type and typography means that the designer goes beyond the traditional paths of typography, and can therefore discover a new direction.

Matthew Carter gave an interesting overview of valuable experiments in Type design during his lecture ‘Over the top’ at ATypi 2018 in Antwerp. Some experiments are progressive and create new avenues, others are not published but are still interesting.  
Within this research I will further focus on the functional experiments to improve reading that have taken place within typography. Even though these experiments from the past were not all equally successful, they remain valuable to look at, and to implement advantages and disadvantages within my own project.

### 2.2.1 Function of improved reading

Experiments in type and typography are of all times. Experiments within type have not only been created since digitization in the 90s and the extensive possibilities that arose within typography. Experiments within typography have been used for much longer, such as these examples (image 5) from Legros and Grant, with digraphs for th en ng (Legros and Grant, 1816).

In their book ‘Typographical Printing Surfaces: The Technology and Mechanism of Their Production’, Legros and Grant were looking in 1816 for a way to save paper by reforming the alphabet. They fused all the digraphs of th and ng into ligatures, which took up less space than the two letters side by side.  
Despite the very interesting approach (for my research) this was an experiment that was not continued. The letters that were combined into one letter form to indicate the correct pronunciation, were too close together, so that the readability was not improved.

Dr. Walter Porstmann was a German engineer and mathematician who made a proposal for a universal alphabet in his book Sprache und Schrift (1920). With his statement he wanted to develop a universal alphabet with which all languages of the world could be written. The alphabet was set up only in lower case. In order to make learning to read easier, and thereby to be able to focus education within other subjects such as sciences, he simplified the alphabet by giving each sound a character. Hereby the phonetics were taken into account, in terms of pronunciation as well as in length and tone. (Image 6a and 6b).

Herbert Bayer designed the ‘fonetik alfabet’ (image 7), a phonetic alphabet for the English language (1959). He designed new characters for the digraphs, like ng, sh, ch, th,... and tried to relate each individual letter to a single sound. Letters were omitted if they were not pronounced. In this way he tried to simplify the reading process.



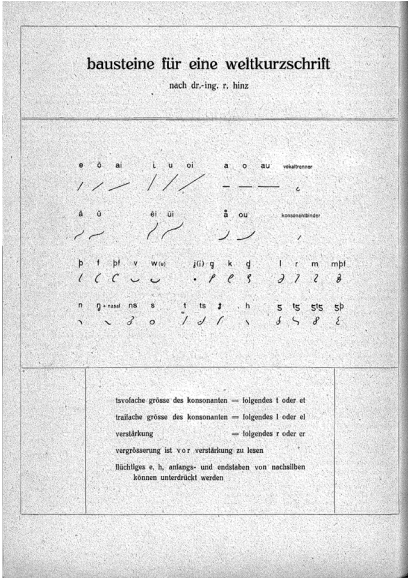


Image 6a. World alphabet  
by Dr. Walter Porstmann. (Porstmann, 1920)

		Primärlaute				Sekundärlaute										Lautverbindungen		Histor. Buchst.	
Laute	3. Bildungsart	Ausdrucksart	Verschlusslaut	Vibrationslaut	Grundvokale	Monillierte Laute u. Uml. J u. Sch-L.	Verschlusslaut	Verschlusslaut	Verschlusslaut	Verschlusslaut	Verschlusslaut	Verschlusslaut	Verschlusslaut	Verschlusslaut	Verschlusslaut	Verschlusslaut	Verschlusslaut	1. Grosse Buchstaben	2. Nicht fonet. Buchstaben
	Stärke und Dehnung	Größe und Schrägung	starke	starke	kurze	kurze	starke	starke	starke	starke	starke	starke	starke	starke	starke	starke	starke		
	1. Sprachwerkzeuge:	2. Sprachwerkzeuge:	3. Sprachwerkzeuge:	4. Sprachwerkzeuge:	5. Sprachwerkzeuge:	6. Sprachwerkzeuge:	7. Sprachwerkzeuge:	8. Sprachwerkzeuge:	9. Sprachwerkzeuge:	10. Sprachwerkzeuge:	11. Sprachwerkzeuge:	12. Sprachwerkzeuge:	13. Sprachwerkzeuge:	14. Sprachwerkzeuge:	15. Sprachwerkzeuge:	16. Sprachwerkzeuge:	17. Sprachwerkzeuge:		
I-Laute	o																		
Gaumenlaute																			
Reine Zungenl.																			
Zisch-u. O-Laute																			
Lippenlaute																			

Image 6b. Phonetic indications world alphabet  
by Dr. Walter Porstmann. (Porstmann, 1920)

FÜR DEN NOIEN MENSCHEN EXISTIERT NUR  
DAS GLEICHGEWICHT ZWISCHEN NATUR UND  
GEIST. ES JEDER ZWISCHENPUNKT DER  
FERGAMENHAIT VAREN ALS VARIATIONEN  
DES ALTEN >NOI<. ABER ES VIEL  
NICHT >DAS< NOI. VIEL DÜRFEN NICHT  
FERGESSEN, DASS VIEL AN EINER ENDE DER  
KULTUR STEHEN, AM ANFANG ALLES ALTEN.

Image 8. Tschichold J.: Phonetic text  
in a single alphabet, 1929

Jan Tschichold, who, just like Bayer, became a real Modernist under the influence of Bauhaus, wrote the manifesto “Die Neue Typography”. He designed the Sabon typeface, but also made an interesting experimental phonetic font that was influenced by Bayer’s Fonetik alphabet. In this typeface he added phonetic letters to the existing alphabet to facilitate the reading. The added elements to the letters and the modified letter shapes refer to the pronunciation of the letters. he letters and the modified letter shapes refer to the pronunciation of the letters (image 8).

Kurt Schwitters designed his Systemschrift in 1927 (image 9). The letter shapes of the vowels have heavier strokes. In this way a phonetic difference and phonetical alphabet has been created.

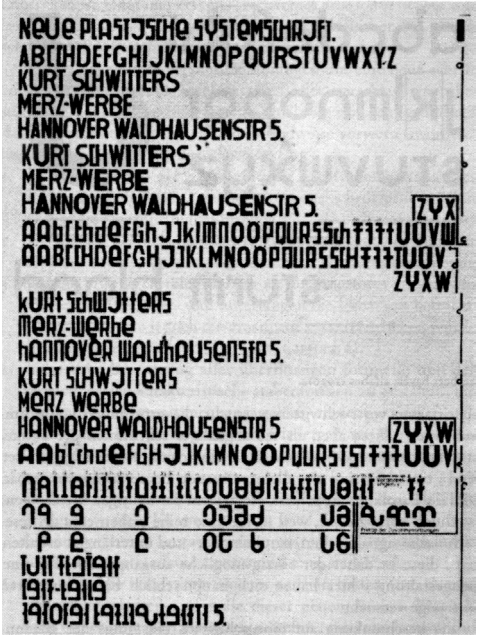


Image 9. Schwitters K.: Systemschrift, 1927.

AN ALFABET KO-ORDINÄTIG FONETISCH  
UND VISUEL BEI DER MORPHOLOGISCHEN  
KOMMUNIKATION

Image 7. Bayer H.: fonetik alphabet, 1959.

Pitman’s Initial Teaching Alphabet

Character	Name	Example
æ	ain	æbl
b	bee	but
c	kee	cat
d	did	dog
ee	een	eeh
f	ef	fun
g	gay	gæt
h	hay	hay
ie	ide	ies
j	jay	jam
k	kay	kiy
l	el	lip
m	em	man
n	en	not
œ	ode	œpen
p	pee	pæ
r	ray	rat
s	ess	sit
t	tee	top
ue	une	uex
v	vee	vois
w	way	wet

Character	Name	Example
y	yay	yellow
z	zed	zæ
s	zess	as
wh	whee	whie
dh	chay	dhurh
th	ith	thin
jh	thee	then
fh	ish	fhip
z	zhee	mezuer
ng	ing	siy
r	er	her
a	ahd	father
a	at	at
au	aud	autum
e	et	egg
i	it	it
o	og	on
u	ug	up
o	oot	bok
o	ood	mœn
ou	oun	out
oi	oin	oil

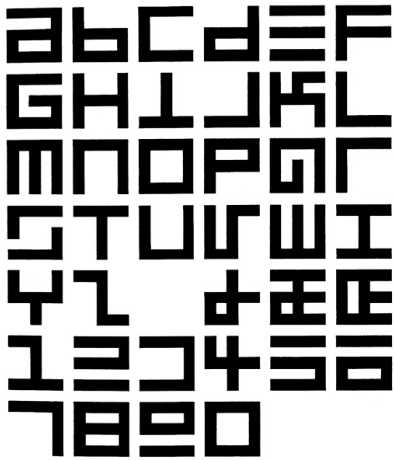


Image 11. Epps and Evans: Typeface for machine recognition, 1969

Image 10: Pitman. Initial Teaching Alphabet. 1961  
<http://www.thesaurustex.com/typo/ita.htm>



Image 12.  
Fuse 1. Neville Brody: State, 1991.  
Fuse 2. Gerard Unger: D'coder, 1991.  
Fuse 3. Barbara Butterweck: Dear John, 1992.  
Fuse 5. Pierre di Siullo: Scratched Out, 1992.

Sir James Pitmann developed his Pitmann’s Initial teaching Alphabet (ITA) in the sixties for the English language. These alphabet (image 10) is not using uppercase, so all sentences are written in lower case. Difficulties within the English language were made clear by the use of ligatures, which reflected the different phonemes.

The alphabet is using the same 26 letters of the Latin alphabet, and has an addition of 14 new characters. These characters are representing phonemes like ‘ng’ or ‘oo’. The alphabet was implemented in the typeface Monotype Ehrhardt, to simplify word and letter recognition. The Initial Teaching Alphabet (I.T.A.) started as an experiment at the Reading Research Unit at the University of London Institute of Education. The alphabet was introduced in some progressive schools in Britain in 1961, and afterwards also in Australia and the US. Once the pupils has been reached the age of seven, they needed to switch to the standard alphabet. The divided success meant that the system was never generally implemented. Only the remaining I.T.A. Foundation in the USA is still using the ITA for dyslexic children.

Epps and Evans developed at the National Physical Laboratory (division of Computer Science) a typeface for machine recognition. Curves and diagonals were avoid in this typedesign (image 11).

Thanks to the progress the Apple computer brought at the Middle of the Eighties, and the Graphic software which came behind, Neville Brody gave from that moment a boost into modernization of typography, with endless experiments that still remain progressive. Fuse (Image 12), published by Fontshop, was a quarterly magazine launched in 1990. Everything became possible within letter design. Every edition designers were asked to develop a font within a certain theme. The boundaries were explored between readability and illegibility.



Pierre di Sciullo. This French Typographer plays with sizes and shapes of letters to clarify the phonetic aspect within French language. Reading becomes a game in which sounds are accentuated by the visual characteristics. His typefaces will try to improve to read out loud French. French phonemes are visualized into sounds. The Sintetik (image 13c) compresses the language, where homophonous syllables are spelt the same way. The Quantange (image 13d) offers as many forms of the letters as there are ways of pronouncing it in French, they are indicating the pronunciation of the French language.

In the fonts Épelle-moi (Image 13a) and Spell me (Image 13b) (French and English version) the letters are used in pronouncing when it is spelled out, so di Sciullo added letters to indicate how it need to be spelled. In the English version Di Sciullo made also an addition, as for example with the letter “u”, which can be used to spell “you”, or the letter “y” for “why?”. Even this was not his mainly intention, with Épelle-moi and Spell me he proves that the identity of a language is country and/or culture bound as he is working on two levels. The diversity in phonetics of these two languages creates on the second level a different graphic identity.

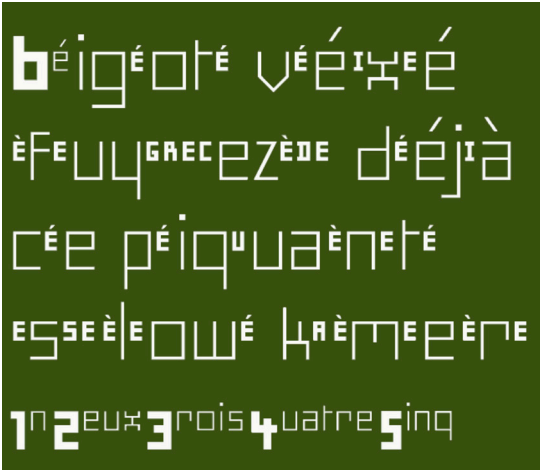


Image 13a. Pierre di Sciullo – Épelle-moi  
(Pierre Di Sciullo: 2019, quieresiste.com)

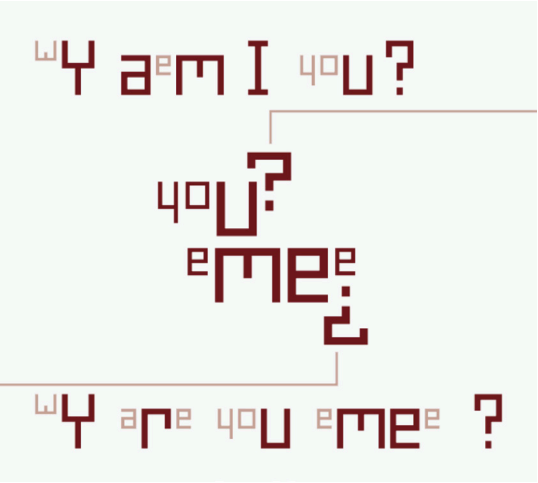


Image 13b. Pierre di Sciullo – Spell me  
(Pierre Di Sciullo: 2019, quieresiste.com)

païn	bin	rať	ra
pin	bin	rať	ra
peint	bin	ras	ra
sein	sin	riť	ri
saint	sin	riť	ri
thym	đin	ris	ri
teint	đin	rōť	ro
tain	đin	peaux	bo
ver	ver	pot	bo
vert	ver	poire	boir
verre	ver	boire	boir
vain	ver	croit	kroi
vers	ver	croit	kroi
père	ber	croit	kroi
paire	ber	quoi	koi
pair	ber	coit	koi
pers	ber	couac	koik
perd	ber	quoique	koik

image 13c. Pierre di Sciullo – the Sintetik  
(Pierre Di Sciullo: 2019, quieresiste.com)

avec Toi je suis  
comme  
le beurke  
avec les radis

sans Toi je suis  
comme  
un pêcheur  
sans filet

Image 13d. Pierre di Sciullo – the Quantage  
(Pierre Di Sciullo: 2019, quieresiste.com)

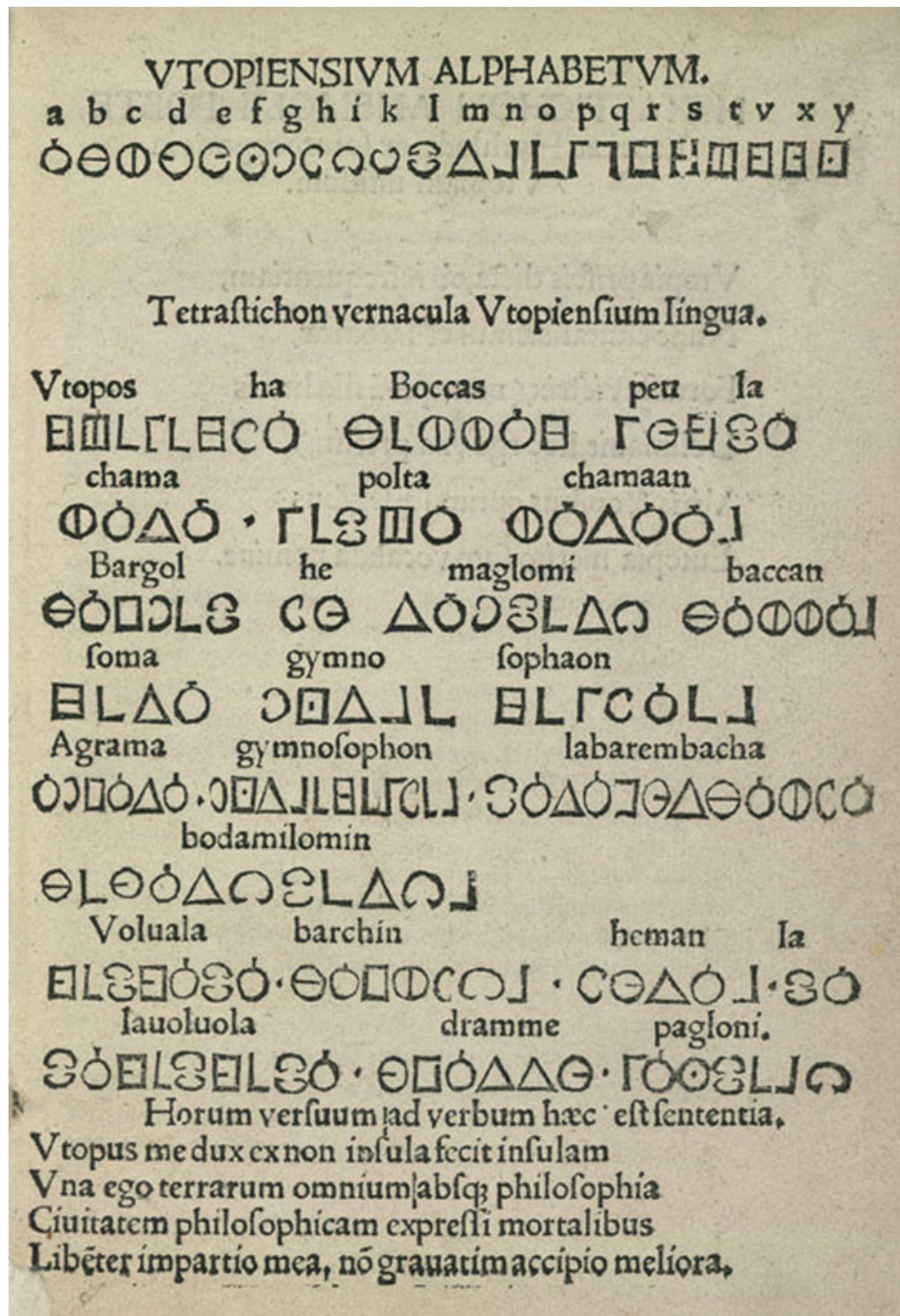


Image 14. Thomas More's Utopia: Utopian alphabet, 1516.

### 2.2.2 Typefaces as visual identities

Next to the purpose of improved reading, a typeface can support visual identities, like complete alphabets for corporate identities. Typography is an essential part of graphic design in order to communicate a message. In graphic design type can fulfill the task of being legible, recognizable and noticeable.

As soon as typography becomes visually powerful, readability decreases and recognizability and visibility improves. For example, Coca cola is not legible but recognizable. The well-considered choice when using type is a powerful tool to attract attention and to reveal and transmit a 'personality' into design. Type has often been served as the primary element in logos, headers, covers (e.g. newspapers) and create thus identities (for example corporate and editorial design).

Type design needs to fulfill every need in a corporate identity keeping the same DNA (not mixing different fonts).

A part of Type design evolved to become more visual (and thus legible) probably in order to serve other functions like identities. They have the power on the letters itself so no graphic or illustration is needed to accompany the type. An identity needs to be visual and recognizable. If it is legible it will not attract the attention (as it has the purpose of assisting the reading process without distraction). (Unger, 2006)

Image 14 is an interesting example from 1516. Utopia, figured out by Thomas Moore, can be described as the ultimate or ideal society. He created a fictional world, in which he also developed a new script recorded in his Utopia Alphabet (1516), with a series of symbols. Each symbol refers to a letter of the Latin Script. This means that you can actually see it as a kind of code language, and that it makes no difference in a phonological way. Connected with the reading process, the pronunciation of the language remains the same as the Latin script to which the symbols refer. Even the characters have no phonological function, yet it is an interesting approach. This fictional language gives through type a visual identity to Utopia.

Herbert Bayer, who became head of the Typography and Design quarter after graduating at the Bauhaus Institute in Weimar, made a geometric rational font, based on circles and rectangles. He was very dedicated to the Bauhaus Philosophy, and had his own ideas about Typography. Why would uppercase and serifs be needed, when the voice does not make capital sounds? Meggs & Purvis (2016) explained this as followed: Two totally different signs for the same spoken sound, like capital 'A' and lowercase 'a' were reduced by omitting the capital letters. In this way it became a clear and simple alphabet, not only in its design, but it also improves reading.

Bayer's font, the Universal Type (1925), became the typeface that would be used for all Bauhaus communications (Image 15).

Universal font became an inspiring example for many typefaces like Kabel, Century Gothic, Bauhaus, Ronda, New alphabet... in the Twentieth century.



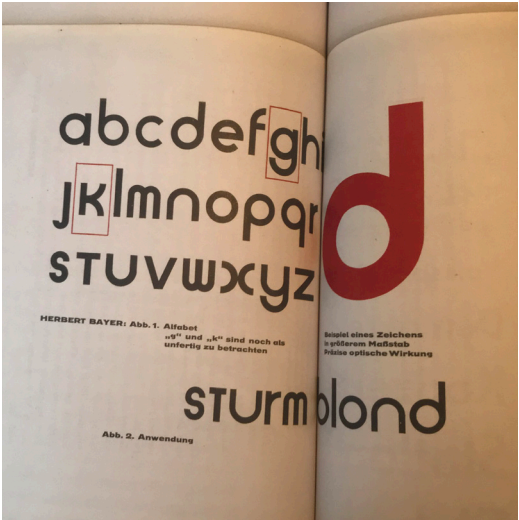


Image 15 Bayer H.: Universal Type, 1925.



Image 16. René Knip - Typedesign Old church and concert building Amsterdam

Also René Knip used typedesign as a visual identity for the old church and the concert Building in Amsterdam. He succeeds in giving each client his own identity through his innovative designs.

Next to that René Knip can give type a new dimension. For the Groningen museum he used type in a very special playful way. His design experiments are very well-considered, and are arising type from a 2D- to a 3D-level, so it can become an endless identity, merging with the surrounding space.

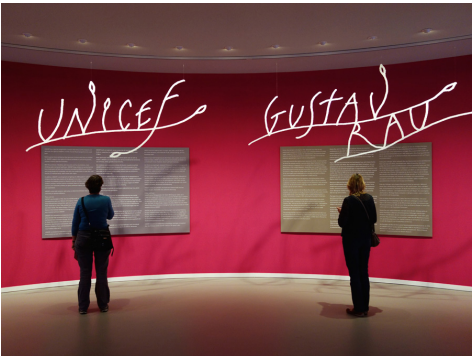


Image 17. René Knip - Typedesign museum Gtoningen

### 2.2.3 Conclusion

Unconventional type holds the possibility to be aesthetic and functional. Therefore, it enriches both the general graphic language and the reading behavior. It has been proven that specific and newly designed type characters can visualize sounds of a language. Being able to see immediately how to pronounce the sounds of a language might facilitate learning a new language. These newly designed unconventional type characters can be the DNA for the visual identity of a language as they are in one glance recognizable and noticeable. This typeface can contribute to bring out a culture and enrich the graphic language in general when it is used in typographic matter.

3. SUBJECT: ENRICHING THE GRAPHIC LANGUAGE

3.1 THE ROLE THAT MY TYPEFACE SHOULD CARRY OUT

Can experiments within type design promote language learning and reading, or are they rather intended as an additional supporting ‘graphic’ element within graphic design?

Type design is an important supporting element to learn language. If typography will be used more clear, language can be learned better. (Gerard Unger, 2006)  
Typography can therefore help to create a typeface in which readability becomes clearer. With typography it is possible to create a text image that is good readable and well balanced.

Maria Geijssel & Cor Aarnoutse (2006) described the importance of the Phonetic awareness during the first stage of reading as followed. The development of phonemic awareness in the first weeks of formal reading instruction National (Dutch) and international research has shown phonemic awareness to be well developed at the start of formal reading instruction. Pupils score high on tests relating to phonemic synthesis (/p/-/oe/-/s/ yields /poes/) and phonemic analysis (/poes/ yields /p/-/oe/-/s/).

To help develop phonemic awareness in language learning, it is believed that it is recommended to support this in a visual way. The question is whether, in addition to being able to read text, typography can be given an additional supporting function, namely accentuating the phonology of the language. Immediately emphasizing visual representation of phonemes could maybe facilitate language learning.

We can speak about two types of Typography: experimental and functional, or a combination of both, where experimental refers to type with unconventional letterforms and functional type design will add a purpose to type with a function of improved reading or recognizability. Both the experimental and the functional typography can be combined and can therefore support and complement each other. In this project both types of typography will simultaneously used for the design research. Starting with experimental typography, as a basis for my further experiment, while exploring the possibilities within type design to create visual aspects for the indication of the pronunciation of the Dutch language. This phonology indication will bring this experiment to a deeper level, functional typography.

3.2 Experimental typography

In order to achieve my goal, namely the visual interpretation of the difficulties within language, I had to look for a path to investigate this experimentally within type design. My source of inspiration was inspired by visually strong geometrical type designs from the past, like Modernism and Constructivism during the Bauhaus period, and more specifically the Universal Type of Bayer (see 2.2.1) which are all based on geometric shapes. Those geometrical letterforms are more unconventional and thus more visually powerful.

I would start with basic shapes that I could build with, like a box of blocks. The most logical way to explore the possibilities was to start developing a geometrical font, where I started from circles with equally high rectangles, which could be combined into one font. The circles and rectangles were split into 8 equal parts. These elements formed the basis for the structure of the font.

Because I wanted to accentuate the pronunciation of the Dutch language, this seemed to be the best start.

Next to the starting point for the font, it was obviously also important to indicate the bottlenecks in the Dutch pronunciation, because the intention is to visually interpret them into a typeface.

The most commonly used phonemes within the Dutch language:

a (short)	(kat, mat, lat, rat, gat, tam, lam, bas, tas, bad,...)
a (long)	(kater, water, later, apen, slapen, adem, vragen, aten,...)
aa	(aap, kwaad, slap, baad, laat, vaas, baas,...)
ai	(amai, detail, medaille, represaille,...)
ai (from French)	air, container, trainer, documentaire, mayonnaise,...)
aai	(papegaai, haai, graai, maai, baai,...)
au	(auto, saus, pauze,...)
auw	(lauw, blauw, miauw...)
d	(oude, koude, dier, doof, ader, moeder, lade, reed, gereden,...)
d	(pronounced as t) (oud, bedeesd, koud, werd, dood...)
c (pronounced as s)	(citroen, cent, cel, census, circus, centrum,...)
c (pronounced as k)	(circus, curve, cursus, cake, coach, code, café, actie,...)
e (short)	(en, er, ter, ...)
e (long)	(eten, weten, kleden, beten,
e (short dull)	(de, het, we, eten, kleden, sleutel,...)
ee	(wee, zeer, heet, beet, kleet, been, hees,...)
ei	(ei, eis, veil, steil, klein,...)
eu	(deur, peuk, jeuk, reuk, zeur, sleutel,...)
eeuw	(eeuw, geeuw, leeuw, schreeuw,...)
i	(pit, vis, kir, tip, klim, in,...)
ie	(dier, tien, zien, hiel, vies,...)
ieuw	(kieuw, nieuw, benieuwd,...)
ij	(wij, hij, zij, blij, fijn, pijl, krijt, zijn, wijn, ijs,...)
o (short)	(pot, mot, mol, bol, bom, kom, som, ton, bos,...)
o (long)	(horen, poten, lonen, komen, lozen,...)
oo	(doof, oor, boor, boos, noot, dood, sloot,...)
ou	(hout, kou, oud, kabouter, stout, schouder,...)
ouw	(vrouw, gebouw, oerwoud, touw...)
ooi	(mooi, tooi, hooi, ooievaar, toernooi,...)
oe	(koe, toen, hoen, hoed, oer, boer, vervoer,...)
oei	(gloeï, moeilijk, boei, groei, loei,...)
u (short)	(bus, hun, put, grut, mus, kus,...)
u (long)	(u, turen, gluren, buren, vuren,
uu	(uur, natuur, absoluut, gluur, vuur, zuur, buur,...)
ui	(ui, lui, thuis, buit, geluid
ng	(dwang, verlang, zang, eng, kreng, ding,...)
nk	(bank, stank, plank, dankbaar,...)
sj	(sjaal, jasje, ijsje, hasj, tsjilpen, sjabloon,...)
ch	(ocharme, nacht, lach, techniek,...)
ch (from French)	(chalet, chef,...)
sch	(schiet, schat, schel, school, schut,...)
wr	(wraak, wroeging, wreed,...)



The initial idea was to build up a font with thick and thin parts, based on a circle and a rectangle. But this was not readable enough.

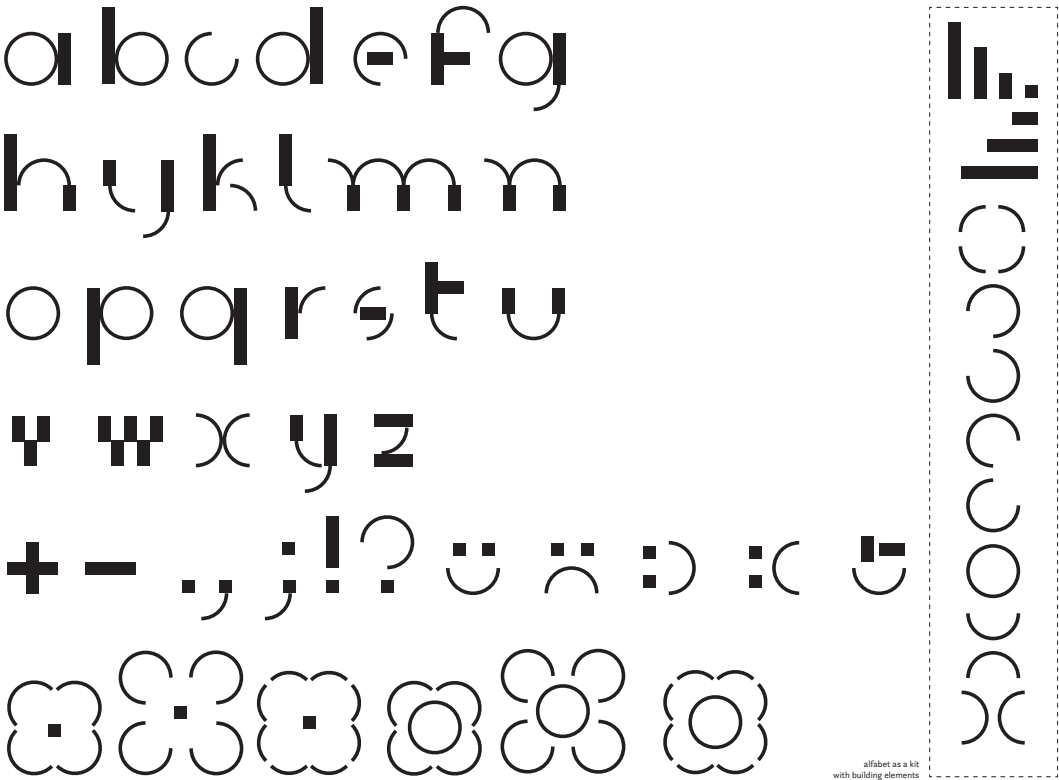


Image 18. First idea, with thick and thin parts.

The next step was to design a basic geometrical type design on which I could add later on the visual accents of the pronunciation of the Dutch language. The basis forms needed to have the same width, so it could be easier to combine all parts to build up the typeface.



Image 19. Basic forms, circle, rectangle, divided parts.

Dividing this basic shapes into 8 equal parts made it very easy to make variations. Between the shapes, infinite combinations could be made to create new letter shapes.

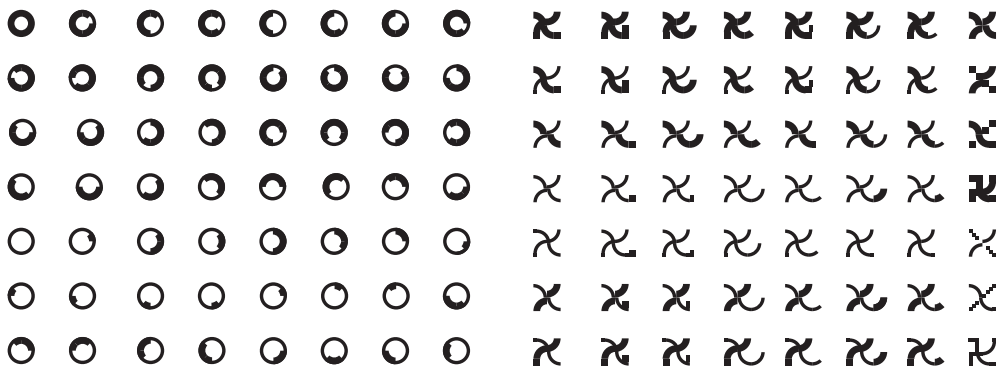


Image 20. Experiments of different characters

Because I wanted to work within the same structure, it turned out that some letters such as ‘s’ and ‘z’ were harder to create. They fell out of the balanced text image. Therefore, a circle shape has been added that fits within the original circle. This made it possible to make variations within the shapes in order to create a balance between the entire alphabet.

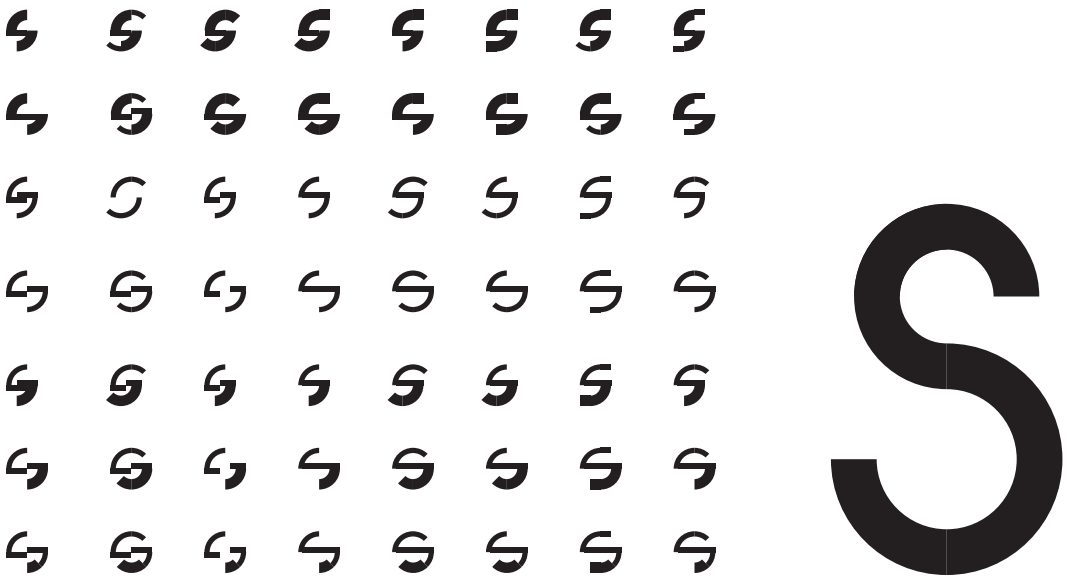


Image 21. Different designs for s.

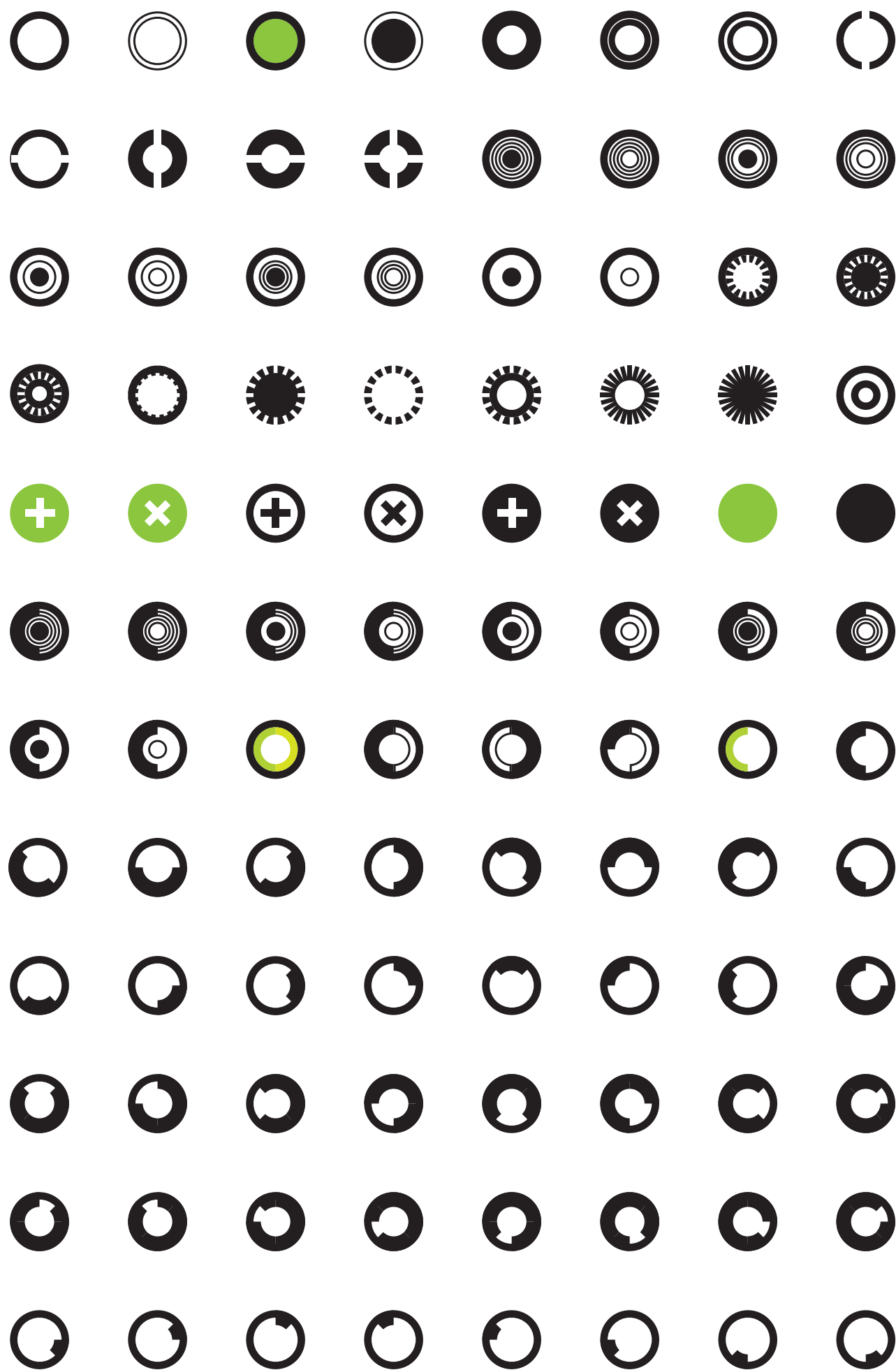
30

Image 22. Geometrical Sans alphabet.

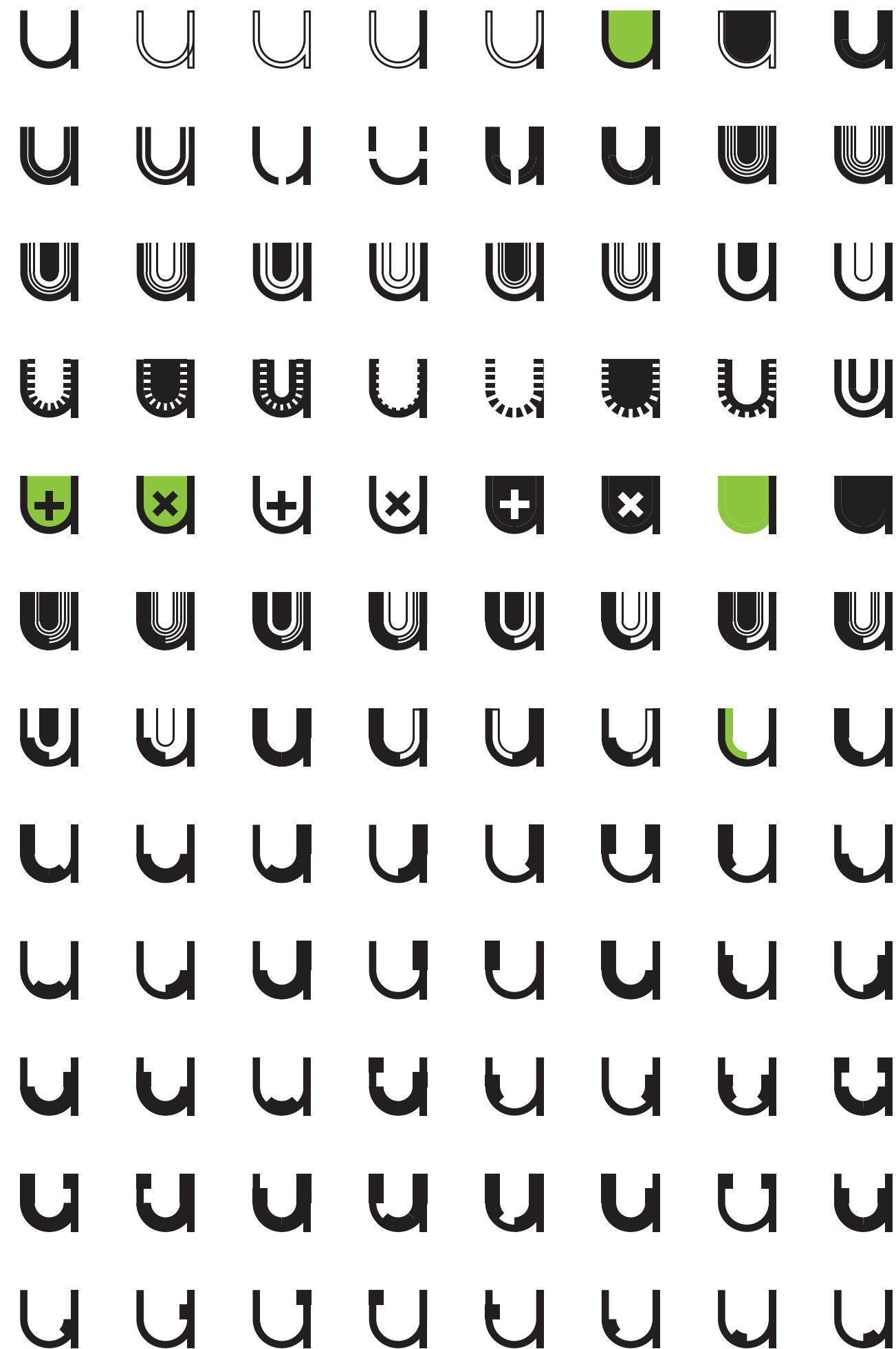
Image 23. Geometrical serif alphabet.

1

The character *o* seems to be the ultimate character to explore all the possibilities. Afterwards an attempt was made to transfer this to the other 'open' sounds, the vowels that can be spoken in different ways.



32



33



Image 25. Experiments phonetic accents. Short and long pronunciation of vowels.

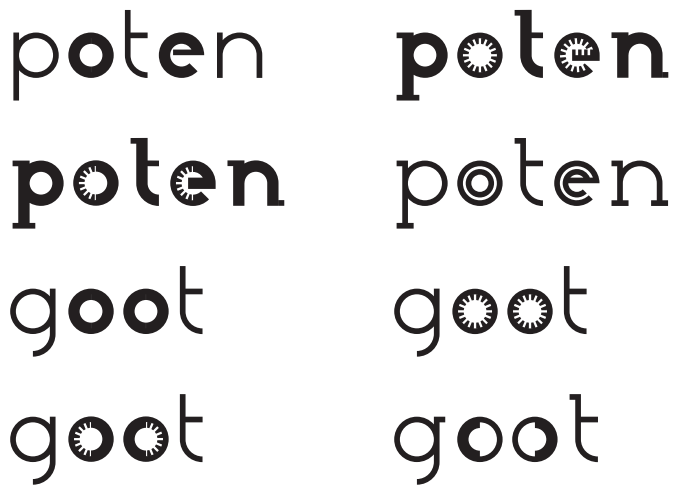


Image 26. experiments Geometrical Serif Phonetic with words

When the language accents are displayed within the letter itself, it seemed very clear. Despite the fact that the visual additions for the phonemes looked good within the letter itself, and were even clear within a word, they became rather disturbing when placed within a text. The text image became very contagious and completely out of balance. It became clear that

too visually holds the possibility of too illegible. Mirroring shapes are very present in this geometrical type design. Instead of creating a supporting readable text, it became a text that became very difficult to read.

**zij had ze lief zoals een moeder haar kinderen liefheeft.**  
zij had ze lief zoals een moeder haar kinderen liefheeft.

Image 27. Experiments phonetic accents into Geometrical Serif Phonetic text.



Image 28 Geometrical Serif Phonetic – mirroring shapes.

It became clear that other solutions had to be found, to make the pronunciation adjustments made within this typeface less ‘noticeable’.

Even this font could be used as a playable, where the user can choose different details for using it for example as a heading, it was not my intention to make an experiment with nice graphic accents, but to promote readability. Unger stated that you read undisturbed with familiar letter forms and familiar typographic patterns. (Unger. 2006) Further research appeared to be necessary to blend the visual accents into the text image in a proper way. I wanted to make the typographic additions less visible, so they could become familiar.

It was about time to see if I could move this experiment to a more conventional and knowable typeface. A first try to bring accents within Times New Roman went wrong.



Image 29. Experiments with Times New Roman with phonetic accents.

The curve of the letters of Times New Roman is more out of balance than that of my geometric font. It is more distinctive because of the contrast that is due to the thick / thin construction of the letter shapes. As a result, it was not easy to transfer the visual accents in these differently constructed letter shapes. The visual additions gave a distorted picture.

z*ij* had ze l*ief* zoals een moeder  
haar kinderen l*ief*h*ee*ft.

z**ij** had ze **lief** zoals een moeder  
haar kinderen **lief**h**ee**ft.

Image. 30 Experiments with Times New Roman with phonetic accents - text image.

To link up more closely with the basic shapes that I had used, it was examined whether it would be possible to use a sans serif font as the basis. A second try was made by placing the visual accents on Verdana bold. This was the first version in which a more balanced typeface became visible. Also the bold version gave a more relaxed text image, with a more balanced contrast. Nevertheless, the graphic indication of the pronunciation remained still asking too much attention...

z*ij* had ze l*ief* zoals een  
moeder haar kinderen  
l*ief*h*ee*ft.  
z**ij** had ze **lief** zoals een  
moeder haar kinderen  
l**ief**h**ee**ft.

Image 31. Experiments with Verdana with phonetic accents - text image.

From this point of view, it was clear that adding graphic elements onto the letters, was giving always a disturbing image. The contrast between the different letters became too high, while the readability still did not improve. I continued to look at phonemes consisting of different letters from a different perspective. The next possibility to visually represent a phoneme which exists of two or more letters is to fuse them into one letter, a ligature.

3.3.1 Typography and ligatures

For creating a fusion of letters into one image, it was important to know whether others had already done this. Have there been experiments with phonemic ligatures? And if yes, did they succeed?

Pitmann’s Initial teaching Alphabet (ITA) (see chapter 2.2.1) formed a new inspiration. This alphabet is not using uppercase, so all sentences are written in lower case. Difficulties within the English language were made clear by the use of ligatures, which reflected the different phonemes. For my own research this approach of Pitman with the phonetic addition with ligatures into the basic alphabet was inspiring. Different characters are merged, and they give an indication about the phonemes.

Prof. dr. Ann Bessemans, who conducted her research on Letter Design for children with visual impairments during her PHD, experimented also with ligatures, but came to the conclusion that they could not serve as an appropriate test font within her research. The biggest error is within the distinguishability of letter forms. The heterogeneity has been implemented too far, as a result of which the balance between homogeneity-heterogeneity is seriously disturbed. (Ann Bessemans. 2012). Of course, her research focused improving reading for — Dutch speaking — children with a visual impairment. It is clear that my research focuses on a different level of legibility, namely making the various phonemes within the Dutch language visually clear for non-native Dutch readers. The research by Prof. dr. Ann Bessemans shows that it is not easy to find a balance in the typeface when letter shapes are adjusted or elements that are added. This is the challenge that keeps coming up within my project and research, namely creating a balanced and calm typeface.

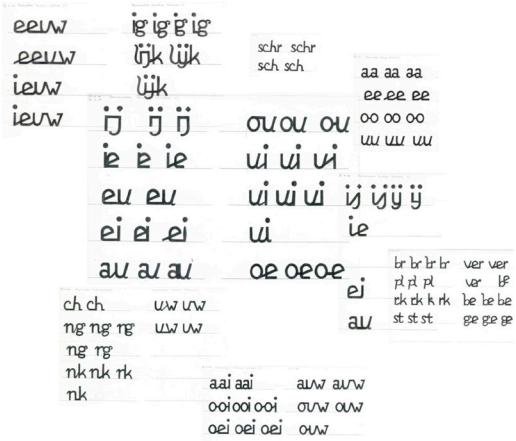


Image 32. Ann Bessemans. 2012. Letterontwerp voor kinderen met een visuele functiebeperking. Ligatures.

Also Kevin Bormans has been doing research within Typography about the region dialects of Flandres. Even though the Flemish and the Dutch habitants speak the same language, in some letter combinations we have still shifts in sounds at different regions. You could consider it as a dialect/diversity within language. Dialects provide a wealth of variations within language. He investigated in 2014 during his dissertation the question of whether a font is capable of visually expressing the phonology of the Flemish regions.

His approach turned out to have the same basis as my research, with the big difference that he focused solely on the dialects within the Flemish language, to visualize these typographically within language. My intention is to visualize the phonemes within our Dutch language to use them as a supporting system for beginning readers. Kevin Bormans had the same interesting approach into his project, by using ligatures, namely to display the same sound within dialects, where there is a big difference between the length of the same sound. He designed a new font, the Bayarde, and has succeeded to display the dialects visually within his font. However, it appears that it is not possible to do this on a font size that is too small to keep the ligatures clear.

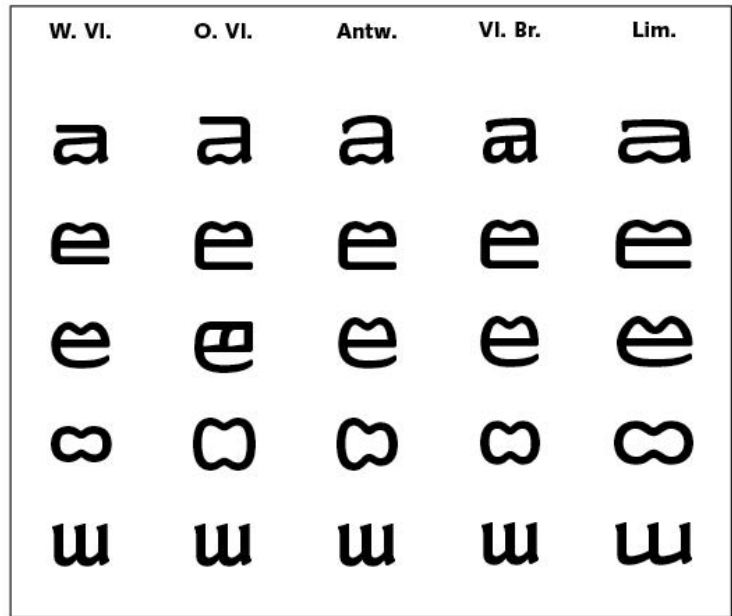


Image 33. Kevin Bormans. 2014. Vlaamse regiolecten. Ligatures.

Pierre Di Sciullo (see chapter 2.2.1) has done a lot of experimentations with visualization of phonology through typography. In his typeface le Kouiji he designed also ligatures for French phonemes.



Image 34. Ligatures in Typeface Le Kouiji, Pierre di Sciullo (2006).

3.3.2 Ligatures into Geometrical Serif

Within my further research I started to see if I could find a solution via ligatures to visualize the different sounds/phonemes of the Dutch language, starting from my Geometrical serif font. Different letters that form one sound were fused into one visual image.

While starting designing my ligatures, the following experiment, Sans forgetica, created by a team of researchers and designers at the Australian RMIT University (2018) took my attention. It uses the principle of psychology that forms are preserved even if they are not visible. The typeface Sans Forgetica (the font to remember) is partly erased and yet it remains legible. Influenced by this wonderful experience, I started to leave some elements from the individual letters for designing my ligatures, but it was important to keep on focus on the visual part. Even some details have been left, the ligatures needed to present a sound or pronunciation.

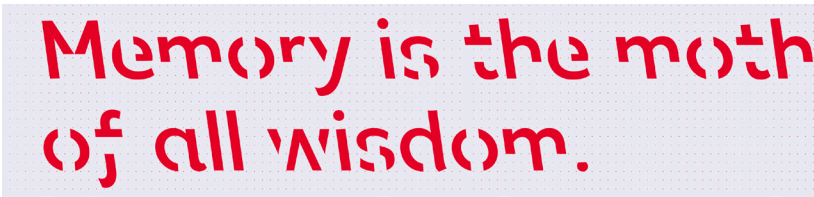


Image 35. Sans Forgetica, the story of Sans forgetica.

Mc Lean already described it as followed. Legibility, in its strict sense, may be less important than both noticeability and recognizability. (Mc Lean, 1980) When repeated it will give instant legibility. The first time it is seen, is far less important than that it should remain, for its intended life, distinctive, attractive and recognizable.

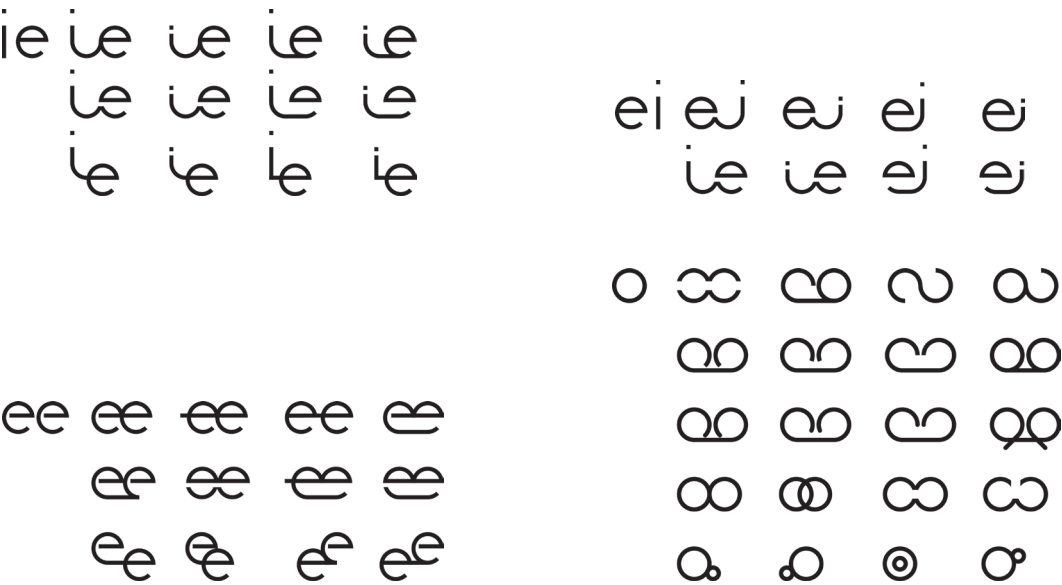


Image 36. Experiments with ligatures in Geometrical Serif. First versions. 2019.





Image 37. Experiments Geometrical Serif Phonetic ligatures in words.

Phonetic rules seem simple when you know the word, how to pronounce its individual letters. This is not the case with beginning readers. (Ann Bessemans. 2012: 35)  
The pitfall was not only to create a beautiful visual abstraction of the merging of two or more letter forms, but above all to maintain legibility. For those who already know the language, the merging of several letters into an abstracted form becomes obvious, the text is easy to read for those who speak the language, even there are new merged characters inside the text. But for beginning readers it is important to keep the individual letter forms clear within this abstraction.

The experimental part within the geometric font was at its limit. It was useful to use this font, the geometrical serif, when designing, because it brought about a fast way of working. By moving the simple geometric shapes like a box of blocks, many options could be designed and viewed. But it remains an experimental font that does not really support readability for beginning readers.

3.3.3 Injection into Times New Roman

From the experiments within my geometric font, I started looking for a well-readable font in which I could add my visual readability system. The Times New Roman font (Stanley Morrison, 1932) from Monotype has been chosen and was used as the basis for this experiment. Times was developed in 1932 by Stanley Morrison (Monotype) for the British Times newspaper. Times New Roman is a wellknown font with a nice contrast, due to the difference between the thickness in serifs and shapes. Due to its familiarity and world wide usage, an implementation on its letter shapes creates an impact.

Making adjustments into a type design that is well-balanced, and which is primarily an icon in typography history, was quite a challenge.

Like Paul Mc Neil said in his book The Visual History of Type, There has probably never been a more popular text face or one with a wider influence than Times New Roman ... because of its distribution in computer operating systems, it has become one of the most familiar typefaces of all time.

The basic forms and links within Times were analyzed. The next step was to translate the ligatures that already were developed within the geometric font into the style and shapes of the Times font.

a a a  
 aa ai ai ai  
 ai ai ai ai  
 sch sch  
 sch sch  
 au au au

Image 38. Experiments Ligatures in Times. Still under construction. 2019.

a a a aa ai ai aai au auw b b c  
 C ch ch d d e e e e e eu ei f  
 fj g h i i ie ij j k l m n ng o o  
 o œ œi oi œi ou ouw p q r s sj  
 sch t t u u uu ui v w wr x y z  
 Amaï, dat dcet pijn! Wat eng...  
 Ga je naar buiten naar het  
 circus? Dœ je sjaal aan, het  
 is koud. Onze auto heeft het  
 moeilijk. Hœ schat je die kans  
 in? Ben je eindelijk hout gaan  
 halen, dat is fijn. Het vlees  
 is taai. Heren horen niet  
 te gluren. De vrouw heeft  
 charme. Ik wrœt verder aan  
 dit berenvel. Gœi je die deur  
 nou even tœ?

Image 39. Ligatures in Times New Roman. Alphabet. Still under construction. May 2019.

### 3.3.4 Pronunciation sounds of ligatures

Further steps into the support of a language related reading process, can benefit of our constantly evolving digital world. Interactivity can provide support through an interactive application, through movement and sound. This would mean that typography can become interactive by getting sound when visually determining it. By making phoneme recordings for this project other phonetic experiments came through. Phonetical experiments with sounds and letters were also done by Bauhaus, Kurt Schwitters and Jan Tschichold. Also Pierre di Sciullo gave sound within his typography with his typeface the Kouije.

In this project, the visualized phonemes of the Dutch language has been recorded and stored in qr codes. They can be scanned and played at any time. By implying this interactive factor through pronunciation sounds a clear link is made with experimentation and functionality. These digital additions can offer extra support in learning the correct pronunciation for beginning language learners.

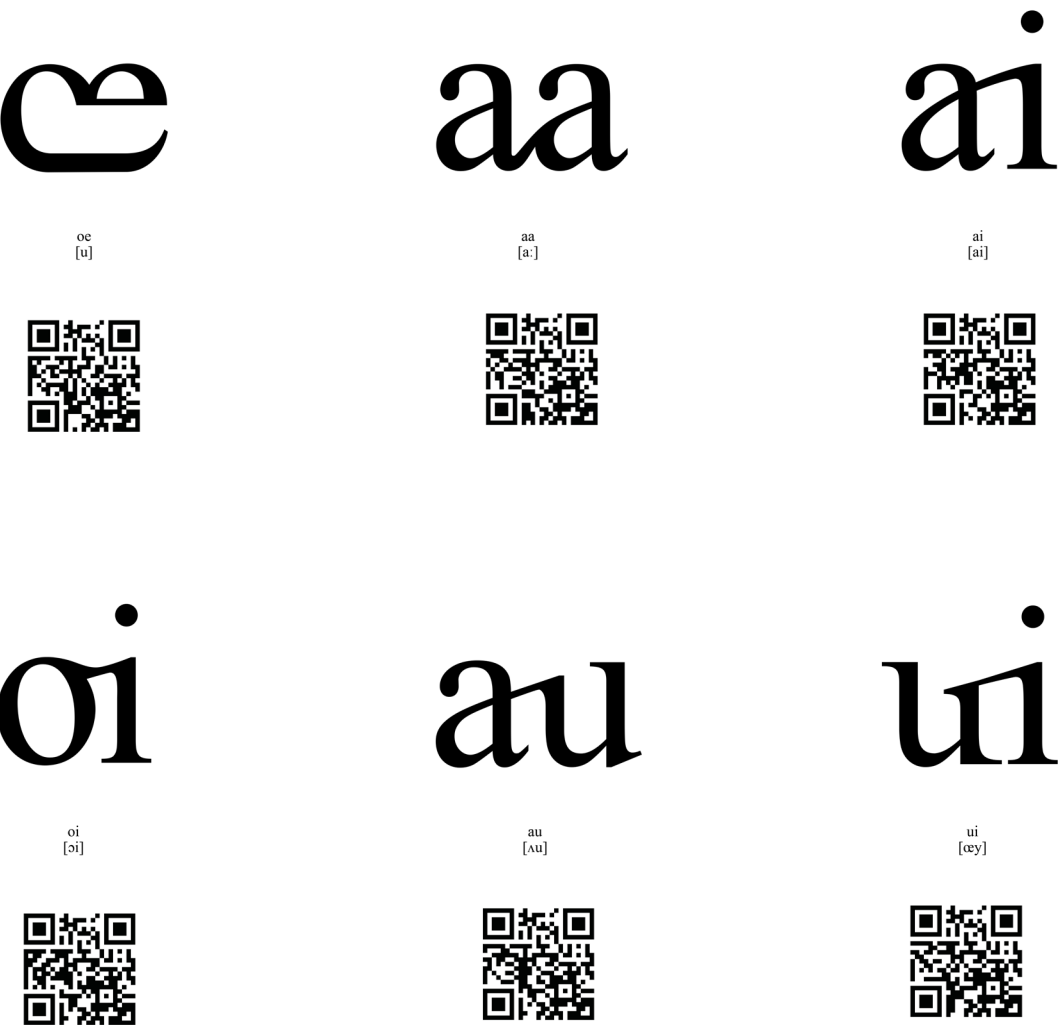


Image 40. Phonemes have been stored into qr-codes.

## 4. ANALYSIS

The aim of this research was to develop a typeface wherein the Dutch phonetic differences / difficulties are visually presented.

The Dutch language is taught using the 26 letters of the alphabet. The pronunciation of 40 to 48 phonemes formed with the 26 letters is a true challenge in learning Dutch. The specific different pronunciations are learned through knowledge and education, but are not visible in our currently used reading methods. The typical phonemes can create stumbling blocks when learning a language, especially for people who do not have Dutch as their mother tongue.

As the IPA is a code language in addition to learning a language, it is not focused on the existing alphabet. Therefore my project is an added value for learning a language as it familiarizes the learners directly with letters and their sound. In this project the phonemes of the Dutch language are visualized within the alphabet. They are not visualizing how you need to pronounce them (this is something you learn during the learning to read process), but they are showing where combinations of letters forms other phonemes (sounds).

In the first experiments of the project, the visual accentuation of the Dutch phonemes in the geometrical letter forms themselves were too visually present within the text image. In that way, the letters gave too much contrast to be able to learn the text clearly. The original goal of offering support in learning the pronunciation of Dutch was lost.

Switching to ligatures within the design process gave this project a boost to visual recognition of the pronunciation of the language itself. The pitfall here was not to abstract the fusion of the letters too much. For those who already know the Dutch language, letter forms will, even if parts are omitted, immediately recognizable by memory. For people who do not have this language knowledge, this link can not be made.

Balancing the ligatures and the design that goes with them were needed to generate new knowledge. The possibility of visualizing the pronunciation of language within an existing alphabet, and more specifically the Dutch language, can be a huge help for newcomers in Belgium who want to learn the language.

Due to the evolution within digital font design, more options become possible to support language learning. Type design is still evolving.

The approach itself of the visual indication of the pronunciation of the Dutch language offers enormous possibilities if the ligatures are balanced and still clearly refer to the original letters. Implementing the ligatures in an existing font, such as Times New Roman, gives the possibility to use it as a universal font in which, in addition to choose a level, another language can be chosen.

The pursuit of the visual representation of the pronunciation of the Dutch language within typography, in order to facilitate the learning of Dutch, appears to be possible. Important is to create a balanced text image, without changing the rhythm of the typeface.

This will of course require another approach to learning to read.

Unger (2006) states that typographers map out routes for readers, which are often not consciously seen but followed. Typography without routes or without organization is a disaster.

Every system has its peculiarities and requires users to get used to it, but it also casually teaches you how to use it.

The most important thing will therefore be explaining the system behind it, a manual about

the visualization of the pronunciation of the additions to the typeface. Once that is clear, the reader will find his way, by visual notes within the language, which indicate pronunciation differences.

Further research will be needed to definitively develop and test this font to find out if the typeface will facilitate reading within different target non-native Dutch groups. When this supporting phonetical system into type design has been further tested with the different target groups of starting readers, it can be further extended to other languages.

The visually translated features of the Dutch language into type gave typography an extra dimension for a functional purpose. Type supports in this way the learning process of reading aloud and serve as an identity of the Dutch language.

The pronunciation of different languages will always remain cultural, country or regional. By infiltrating the phonology of the Dutch language within the font itself by placing visual accents (ligatures) within the text image, the individuality of the Dutch language has been visualized. Typography has become a carrier of the visual identity of the Dutch language, and the language has become a visual identity. It could be also possible to apply this approach to other languages, whereby each language can become an individual visual identity based on other details into type design.

**5. LITERATURE**

**5.1 BOOKS AND ARTICLES**

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Image 2. Bessemans, Ann. Frutiger, Adrian. 1981. *Conventional letterforms* . ‘Typography speaks. The vocabulary for improving printed matter’ in 2017 in Warsaw and in 2018 at PXL Hasselt.

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Image 11. Epps and Evans. 1696. *Typeface for machine recognition*

Image 12. Brody, Neville. 1991. *State*. Fuse 1

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Image 12. di Sciullo, Pierre. 1992. *Scratched Out*, Fuse 5

Image 13a. di Sciullo, Pierre. (2006). *Épelle-moi* (Pierre Di Sciulio: 2019, quieresiste.com)

Image 13b. di Sciullo, Pierre. *Spell me* (Pierre Di Sciulio: 2019, quieresiste.com)

Image 13c. di Sciullo, Pierre. *The Sintetik* (Pierre Di Sciulio: 2019, quieresiste.com)

Image 13d. di Sciullo, Pierre. *The Quantage* (Pierre Di Sciulio: 2019, quieresiste.com)

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Image 15. McNeill, Paul. 2017. The visual history of type. *Bayer, H. 1925. Universal Type*.

Image 16. Knip, René. *Typedesign Old church and concert building Amsterdam*. <http://www.atelierreneknip.nl>

Image 17. Knip, René . *Typedesign museum Groningen*. <http://www.atelierreneknip.nl>

Image 18-31. Own designs. Under construction. 2018-2019

Image 32. Bessemans, Ann. 2012. *Letterontwerp voor kinderen met een visuele functiebeperking*. Doctoraat/proefschrift, universtiteit Leiden en Hasselt.

Image 33. Bormans, Kevin. 2014. *Vlaamse regiolecten via letters*. Proefschrift. Ligatures.

Image 34. Di Sciullo, Pierre. *Ligatures in Typeface Le Kouiji*, Pierre di Sciullo (2006).

Image 35. RMIT university behavioural Business Lab. 2018. Sans Forgetica, the story of Sans forgetica. 2018.

Image 36-39 Own designs. Under construction. 2018-2019



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